2011 Pipeline Performance and Activity Report

BC Oil and Gas Commission

Table of Contents

BC Oil and Gas Commission	2
Pipeline Performance and Activity	3
Integrity Management Programs	5
Pipeline Requirements	6
Incidents	6
Product Releases	10
Moving Forward	11
Contact www.bcogc.ca	11

About the

BC Oil and Gas Commission

The BC Oil and Gas Commission (Commission) is the provincial regulatory agency with responsibilities for regulating oil and gas activities in British Columbia, including exploration, development, pipeline transportation and reclamation.

The Commission's core services include reviewing and assessing applications for industry activity, consulting with First Nations, cooperating with partner agencies, and ensuring industry complies with provincial legislation and all regulatory requirements. The public interest is protected by ensuring public safety, respecting those affected by oil and gas activities, conserving the environment, and ensuring equitable participation in production.

For general information about the Commission, please visit www.bcogc.ca or phone 250-794-5200.

Mission

We regulate oil and gas activities for the benefit of British Columbians.

We achieve this by:

- Protecting public safety,
- Respecting those affected by oil and gas activities,
- Conserving the environment, and
- Supporting resource development.

Through the active engagement of our stakeholders and partners, we provide fair and timely decisions within our regulatory framework.

We support opportunities for employee growth, recognize individual and group contributions, demonstrate accountability at all levels, and instill pride and confidence in our organization.

We serve with a passion for excellence.

Vision

To be the leading oil and gas regulator in Canada.

Values

Respectful

Accountable

Effective

Efficient

Responsive

Transparent

Purpose of Report

Pipeline Performance and Activity

The oil and gas industry in British Columbia is dependent on pipelines to distribute oil and gas resources. Pipelines are a common mode of distribution and recognized as a safe and economical way to transport oil and gas. The secure operation of these pipelines is essential for public safety and environmental protection.

This report provides a statistical overview of operating, deactivated and abandoned pipelines in British Columbia regulated by the BC Oil and Gas Commission (Commission). It includes data on types of pipelines, their lengths and uses, incident rates and details the Integrity Management Program.

The Commission regulates pipeline activities ranging from pipeline construction to pipeline operation, maintenance, and abandonment. Its jurisdiction extends to all pipelines as defined in the Oil and Gas Activities Act (OGAA).

Pipeline activities are regulated under the Pipeline and Liquefied Natural Gas Facility Regulation (PLNGFR), which states that all pipelines must be operated and maintained in accordance with CSA Z662 - Oil and Gas Pipeline Systems. Other applicable regulations include the Environmental Protection and Management Regulation and Consultation and Notification Regulation.

A Pipeline Permit Application Manual guides applicants through the pipeline permit application process and requirements, and a Pipeline Operations Manual details post-approval processes, including submissions mandatory to all projects, notifications and amendments.

In addition to these manuals, the Commission posts reports and fact sheets on its website at www.bcogc.ca.

Pipeline Defined

Pipeline means, except in Section 9 of OGAA, piping through which any of the following is conveyed:

- Petroleum or natural gas.
- Water produced in relation to the production of petroleum or natural gas or conveyed to or from a facility for disposal into a pool or storage reservoir.
- Solids.
- Substances prescribed under Section 133(2)(v) of the Petroleum and Natural Gas Act.
- Other prescribed substances.

The scope of a "pipeline" also includes installations and facilities associated with the piping, but does not include:

- Piping used to transmit natural gas at less than 700 kilopascals (kPa) to consumers by a gas utility as defined in the Gas Utility Act.
- A wellhead.
- Anything else that is prescribed.

Pipelines not regulated by the Commission including pipelines crossing provincial and/or federal borders (regulated by the National Energy Board) are not addressed in this report.

Pipeline Inventory

The Commission regulates 39,023 kilometres (km) of pipelines in British Columbia. Pipelines transport a number of refined and unrefined products including natural gas, sour natural gas, crude oil, water, high vapour pressure and other miscellaneous gases and oil effluent .

As Table 1 shows, in 2011 a net addition of 1,549 km of total registered pipelines went into operation. The most significant increase was with water pipelines, due to a decrease in trucking water to wellsites and an increase in pipeline use. The net decrease in the length of sour gas pipelines was due to the abandonment of older pipelines.

Pipelines are defined as follows:

- Abandoned pipeline: piping removed from service and not maintained for later return to service.
- Deactivated pipeline: piping removed from service but is maintained for later return to service.
- Operating pipeline: piping actively used for the transport of fluids related to oil and gas operations, and piping which has been suspended from service for less than 18 months, but not formally deactivated or isolated.

The various pipeline product types encompass the following:

- Sour natural gas includes natural gas with a hydrogen sulphide (H_2S) partial pressure greater than 0.3 per cent.
- Natural gas includes natural gas, sweet gas and fuel gas.
- Crude oil includes crude oil, sour crude and LVP.
- Water includes water, freshwater, produced water, saltwater and sour water.
- High vapour pressure (HVP) includes ethylene, propane, pentanes and liquid ethane.
- Other includes miscellaneous gases and oil effluent.

Table 1: Total Length of Pipeline (km) by Product Type and Service

	2011				2010		2009
	Total	Operating	Deactivated	Abandoned	Total	Operating	Total
Sour Natural Gas	11,910	11,878	19	13	12,309	11,952	12,065
Natural Gas	19,159	18,674	302	183	19,147	18,717	18,013
Crude Oil	2,412	2,289	98	26	2,717	2,603	2,738
Water	2,977	1,575	751	651	1,321	1,209	1,186
HVP	359	255	22	82	230	217	171
Other	2,206	1,640	265	301	1,750	1,663	1,695
Total	39,023	36,311	1,457	1,256	37,474	36,361	35,868

Integrity Management Programs

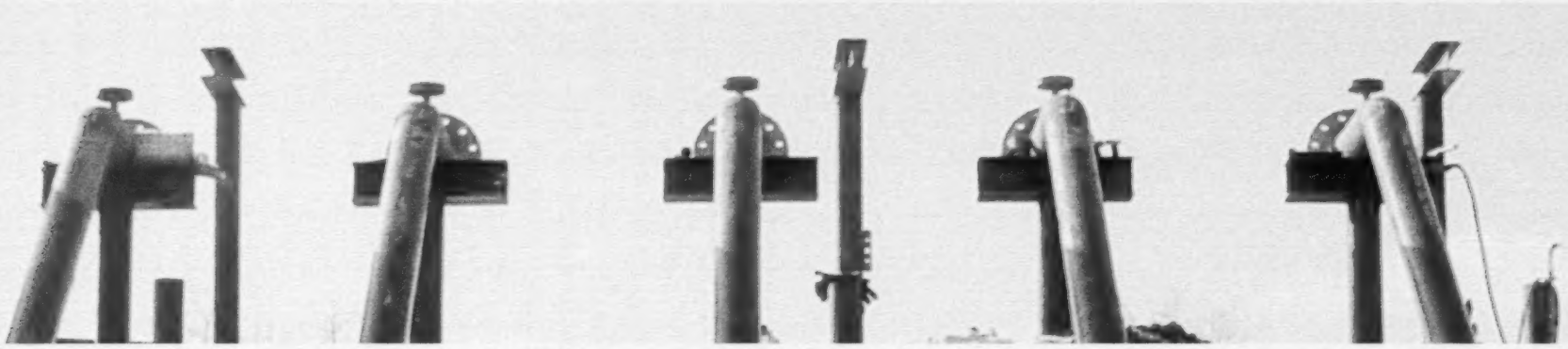
Pipeline Integrity Management Programs (IMPs) play a key role in ensuring permit holders have proper mitigation measures to reduce the risk of all potential hazards. They ensure pipeline systems are safe for continued service and include procedures to monitor conditions that may lead to failures, as well as eliminate or mitigate such conditions. IMPs provide a systematic approach for maintaining pipeline integrity throughout the entire pipeline lifecycle.

As required by the Commission under Section 7 of the Pipeline and Liquefied Natural Gas Facility Regulation, every permit holder designing, constructing, operating, maintaining or abandoning pipeline infrastructure in British Columbia must have a fully developed and implemented IMP. To facilitate compliance, all permit holders must follow the most current version of CSA Z662, including Annex N. CSA Z662 is the standard developed and maintained by the Canadian Standards Association covering the design, construction, operation and maintenance of oil and gas industry pipeline systems that convey liquid hydrocarbons, oilfield water and/or steam, carbon dioxide for oil field use, or gas. It is legally required to meet this standard for pipelines which operate under OGAA in British Columbia.

In 2011, the Commission launched a self-assessment protocol for IMPs. All permit holders will be assessed over a five year period. Seventeen selected pipeline permit holders were requested to complete and file a self-assessment of their IMP in 2011. All selected permit holders were in general compliant with the requirements for an IMP. Where compliance was not 100 per cent, measures were enacted by the permit holders to correct the deficiencies.

There were four key areas for IMP improvements that were noted with almost all the permit holders reviewed:

- There was no identified procedure for yearly internal audits of the IMP.
- Competency assessments for field crews were well documented, but competency assessments for management and technical personnel were not.
- Not all reasonable potential hazards were identified in the IMP.
- Documentation of continuous improvement initiatives was not available.



Pipeline Requirements

Section 37 of OGAA states a permit holder and a person carrying out oil and gas activity must prevent spillage and promptly report to the Commission any damage or malfunction likely to cause spillage that could be a risk to public safety or the environment. Section 38 also contains a provision whereby the permit holder must prepare and maintain an emergency response program and a response contingency plan approved by the Commission.

If spillage occurs, a permit holder or person carrying out an oil and gas activity must promptly do all of the following:

- Remedy the cause or source of the spillage.
- Contain and eliminate the spillage.
- Remediate any land or body of water affected by the spillage.
- Report to the Commission the location and severity of spill and any damage or malfunction causing or contributing to the spill, if the spillage is a risk to public safety or the environment.

A person who is aware that spillage is occurring, or is likely to occur, must make reasonable efforts to prevent or assist in containing or preventing the spillage.

The Commission has a 24/7 emergency centre to respond to incidents such as spills. Depending on the level of the incident, the Commission may respond with trained personnel to ensure any risk to the public and environment is mitigated.

As per Section 38, permit holders must prepare and maintain emergency response programs and response contingency plans, which must be updated annually. The Commission regularly audits the effectiveness of these programs to ensure they adequately respond to the hazards identified, as well as oversees emergency exercises. Failure to satisfactorily meet these requirements can result in compliance and enforcement actions.

Incidents

Incident reporting occurs regardless of the status of the pipeline or the type of product released. Even incidents in which there is the potential for release of product, but no release, must be reported. All reported incidents are assessed by the Commission to determine what remedial actions must be taken and whether the pipeline can continue to operate. The Commission also conducts investigations to determine cause and contributing factors in which any remedial actions and repairs are identified in order to prevent a recurrence. The permit holder must submit a post-incident report to the Commission, which summarizes the root cause of the incident, repair methods, operational changes and design changes that may be required. If necessary, the Commission issues recommendations to industry and posts online (www.bcogc.ca/publications/safety-advisories).

In 2011, there were 34 pipeline incidents reported to the Commission as shown in Figure 1. Analysis of the incidents in both 2010 and 2011 shows that the leading factor in pipeline incidents is internal corrosion. The overall incident frequency for 2011 was 0.87 incidents for every 1,000 km of pipeline (as compared to a frequency of 1.38 incidents per 1,000 km in 2010). Pipelines carrying water, HVP and "Other" fluids all had high incident rates, with 2.69, 2.79 and 2.72 incidents per 1,000 km respectively. This compares with water carrying lines having the highest incident rate in 2010, with 4.96 incidents per 1,000 km.

Table 2 shows the frequency of pipeline incidents under the Commission's jurisdiction per 1,000 kilometres of pipelines. The implementation of OGAA in 2010 led to broader reporting criteria. Prior to 2010 only incidents causing a release were reported, but now all incidents that have the potential to affect the integrity of a pipeline must be reported.

Metal loss was the leading mechanism of failure that resulted in 50 per cent of all pipeline incidents in 2011 as illustrated in Table 3 (next page). Internal corrosion, while a factor in all types of steel pipeline incidents, becomes prevalent in pipelines transporting corrosive substances such as hydrogen sulphide, carbon dioxide and water.

Figure 2 (following page) shows incidents in relation to pipeline type for 2011. Corrosion was the major cause of failure in sour natural gas, sweet gas and water pipelines. Hydrogen sulphide, carbon dioxide and water are the most critical components in triggering corrosion in steel pipelines. "Other causes" for incidents were listed in Table 3 as being due to improper operation. Other pipeline types included sweet emulsion lines and oil well effluent lines.

Figure 1: 2011 Pipeline Incidents by Product and Cause

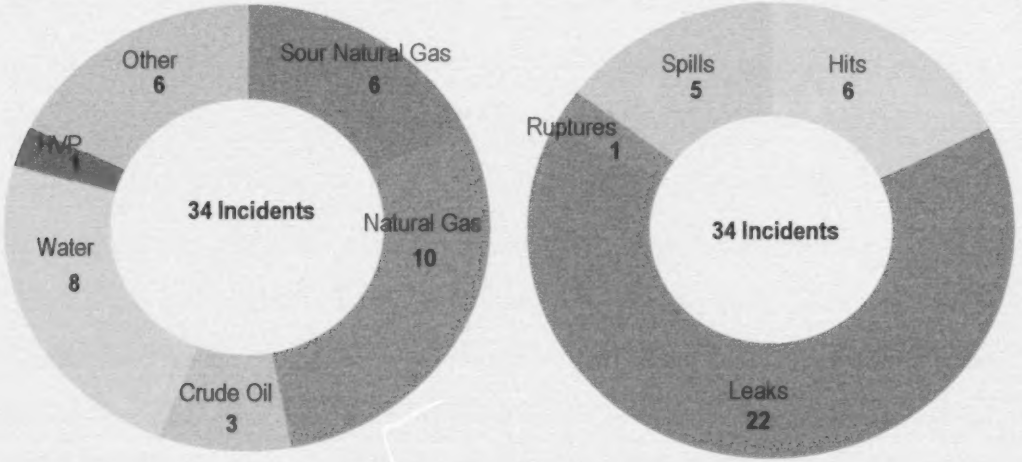


Table 2: Total number of incidents per 1,000 km of pipeline inventory

	2011	2010	2009
Length of Pipelines (km)	39,023	36,361	35,868
Number of Incidents	34	50	37
Incident Frequency (Incidents/1,000 km)	0.87	1.38	1.03

Type of Pipeline	2011 Length of Pipeline	# of Incidents	Frequency (per 1,000km)
Sour Natural Gas	11,910	6	0.50
Natural Gas	19,159	10	0.52
Crude Oil	2,412	3	1.24
Water	2,977	8	2.69
HVP	359	1	2.79
Other	2,206	6	2.72

Table 3: Classification of Pipeline Failures

Incident Cause	Definition	2011	2010	2009
Metal Loss	Wall thickness reduction due, for example but not exclusively, to corrosion			
Internal Corrosion	Loss from internal surface of pipe body or weld due, for example to corrosion or erosion	10	14	15
External Corrosion	Loss from external surface of pipe body or weld due, for example to corrosion or erosion	5	2	1
Suspected Corrosion	Most likely due to corrosion although internal/external corrosion has not been confirmed	2	4	1
Total Metal Loss		17	20	17
Pipeline/Equipment Failure				
Cracking in Pipe	Mechanically driven or environmentally assisted cracking of the pipe	0	0	0
Pipe Fittings / Joint Failure	Failure in valve, weld, flange, etc.	6	2	1
Miscellaneous Equipment	Failure in the tank, compressor, site seeing glass, etc.	0	9	2
Total Cracking		6	11	3
External Interference	External activities causing damage to pipe			
Third Party Interference	Interference by someone other than operating company or its employees/contractors	1	5	0
Company	Interference by operating company or its employees/contractors	5	2	3
Vandalism	Interference caused willfully by somone through attempted theft of service fluid	0	0	1
Total External Interference		6	7	4
Material Manufacturing or Construction	Defects in the fitting, construction or components	2	1	3
Geotechnical Failure	Loss of integrity due to geotechnical effect, for example, slope movement or weather	2	3	3
Other Causes	Other causes not included in previous definitions			
Improper Operation	Decision error made by operating company during service	1	8	7
Overpressure	Failure caused due to overpressure of pipe	0	0	0
Total Other Causes		1	8	7
TOTAL INCIDENTS		**34**	**50**	**37**

Figure 2: 2011 Incident Cause by Pipeline Type

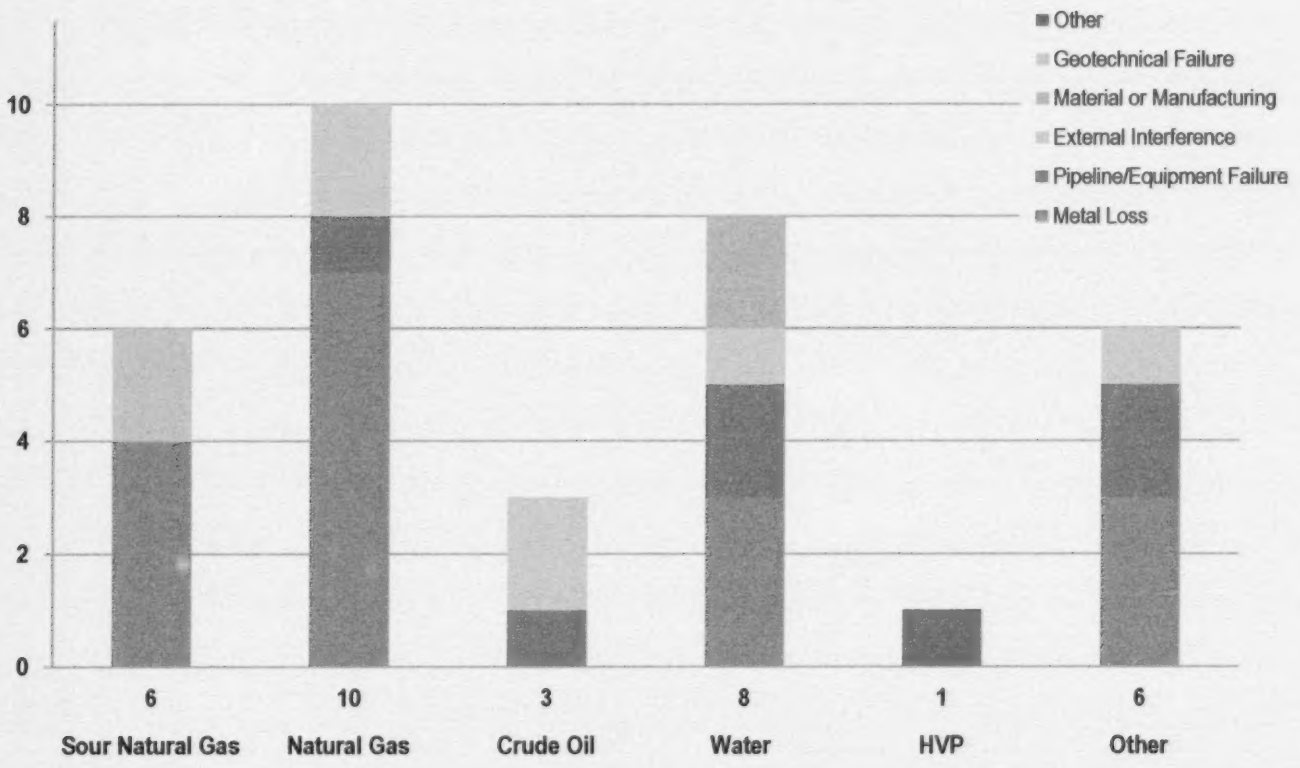


Table 4: Liquid Volume Released by Product in 2011

Spill Liquid	Volume (m^3)
Crude Oil	4
Produced Water	112
Fresh Water	2
Other	0
Emulsion	17

Table 5: Gas Release Volume by Product in 2011

Spill Gas	Volume (m^3)
Sour Natural Gas	81,306
Natural Gas	5,011
Other	0

Product Releases

For 2011, the largest reported liquid release was 60 cubic meter (m^3) of produced water. After investigation, this leak was determined to be caused by a misaligned flange installed during initial construction.

There were two significant reported gas releases in 2011 making up 96 per cent of the total volume of uncontrolled gas released for the year. The largest incident was due to high water flow rates at a river crossing that scoured out the ground supporting the pipeline and resulting in a rupture and release of 78,300 cubic metres (m^3) of sour natural gas (1.5 per cent H_2S) prior to being isolated with existing valves. The nearest residence to this leak was located 2.2 km away and was not affected. The second incident was caused when a fuel gas line was struck by a third party performing a directional drill near the pipeline, causing a release of 5,000 m^3 of sweet natural gas.

Table 4 and 5 shows the total volume of releases in 2011 by product type.

Moving Forward

It is anticipated in the next few years pipeline inventory will increase with the installation of liquefied natural gas plants. Looking ahead, the Commission will continue to improve the regulation of IMPs by continually engaging with pipeline operators to ensure proper precautions are set in place to prevent pipeline incidents and if incidents do occur, they are appropriately managed from emergency response through to final remediation. IMPs are continuing to improve the building and maintenance of pipelines, including older, legacy pipes that may not be constructed to the same standards of today.

A strong regulatory structure for all aspects of oil and gas development begins with the engineering, hydrology, geology and technology experts within the Commission. An increase in critical operating positions in 2012 in the pipeline division is helping to meet increased workloads.

The Commission recognizes the need for communication and transparency with the general public in regards to its role as a regulator of oil and gas activities and protecting public safety. Efforts will continue to bolster information and knowledge sharing between the Commission, public, stakeholders, scholars and experts.

More Information

Contact www.bcogc.ca

This report is updated as required. For specific questions or enquiries regarding this report, please contact:

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